About This CD
Presentations
Speakers
Related Info
Exit

Document Type Definitions for Product Data

The Web was originally developed to provide a low cost means for internationally dispersed groups of humans to share information with one another. As we begin the 21st century, we see the Web evolving into a global distributed computing environment where software applications share information with one another. XML (the eXtensible Markup Language), the universal format for structured documents and data on the Web, helps makes this exchange possible. However, it is important to remember that XML alone is unable to capture the semantics of manufacturing application data. In order to fully realize XML's benefits for manufacturing systems integration, we must combine XML with other integration technologies.
In this session, we provide an overview of XML, discuss its role in manufacturing systems integration, and describe strategies for XML representation of existing manufacturing and engineering information models and data sets.

Presented by Martin Hardwick
President, STEP Tools, Inc. (Further information unavailable.)

Scroll to start

Document Type Definitions (DTD's) for Product Data

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What is STEP

- **An International Standard for technical data about products including**
  - Geometry and topology
  - Assembly and configuration information
  - Manufacturing attributes
- **Move to STEP initiated by CAD users in US, Far East and Europe in 1984**
  - Want more interoperability in design and manufacturing
  - Independence from CAD vendors
  - Reduce costs for supply chain
- **Two hundred of the worlds best product data specialists meeting three times per year to progress the standard for the past fifteen years.**

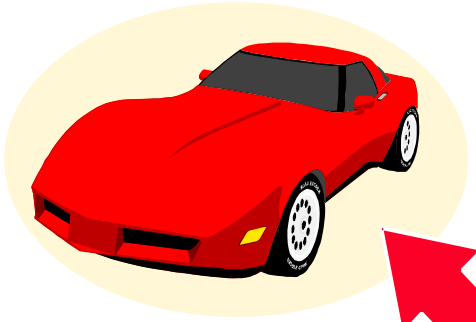
200 experts produced:

- A rich, flexible standard for product data using EXPRESS the most powerful modeling language for data available today.
- An integrated suite of complete, unambiguous models for product data
- A standard that can grow with the changing needs of industry.
- Ancillary specifications like a file format (P21) and application programming interfaces (SDAI)

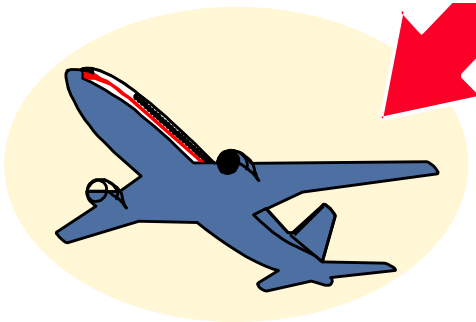
STEP Tools develops software tools to make implementing and using the STEP ISO standard easy

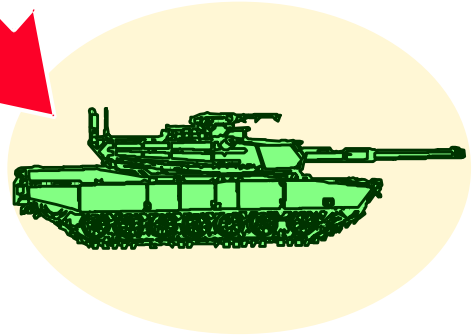
Vendors using our STEP solutions

- **CAD Translators**
  - SGI Alias, Bentley, Unigraphics, CADKEY, Cimatron, HZS, Entity Systems
- **CAE Translators**
  - Tecnomatix, Deneb
- **PDM Translators**
  - IMAN, Sherpa, Boeing DCAC/MRM (Metaphase)
- **CAM Translators**
  - Bridgeport Controls, DelCAM, Licom, Fanuc Robotics
- **Other products with STEP translators**
  - AutoCAD, CATIA, Intergraph, Pro/Engineer, SDRC, MSC NASTRAN….



There are now more than one million STEP enabled CAD stations in the world





With CAM and CAE systems following

The opportunity in manufacturing

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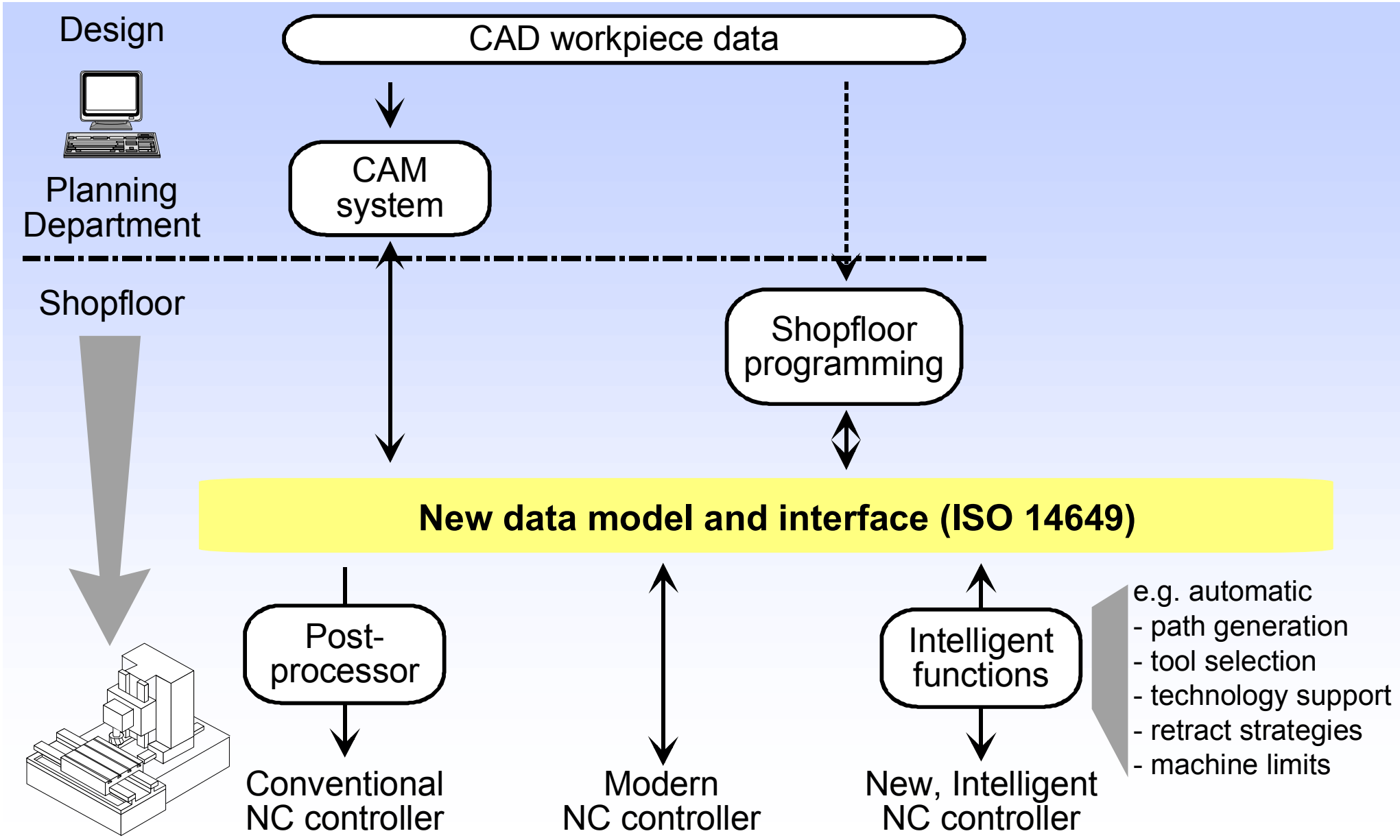


Value

The supplier creates the production process from a 3D product model instead of paper drawings*

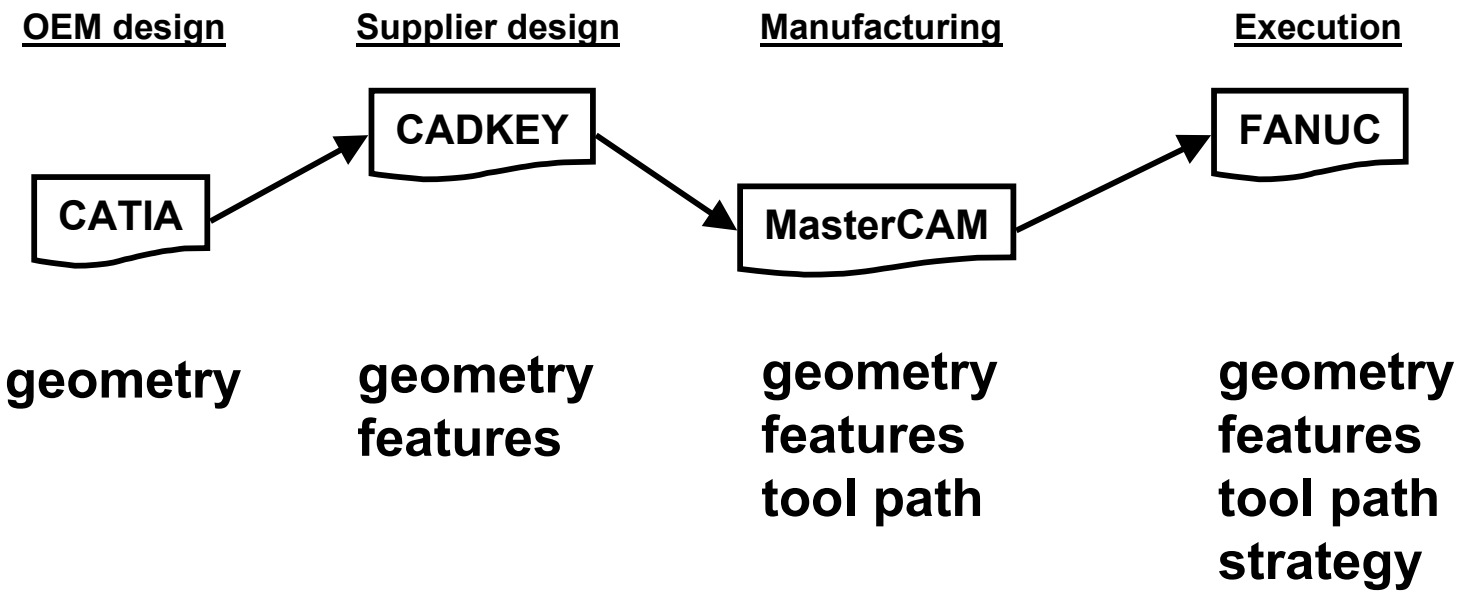
		Without STEP				With STEP	Saving
		Max	Min	Average			
Time to make a process plan		100	4	16		12	25%
Time to replan a process plan		20	1	4		3	25%
Number of iterations				3		2	33%
Total Hours				28		18	36%
Number of plans per Year				1000		1000	
Burdened cost per hour				$50		$50	
Total Cost				$1,400,000		$900,000	36%

*Numbers are for a “typical” machine shop
Plus 75% savings for OEM because for not making the drawing

The Problem

- **As STEP moves downstream writing translators becomes more difficult.**
  - New vendor must write upstream information plus value add
  - Downstream vendors are typically smaller

Traditional Data Exchange



Product Data DTD's

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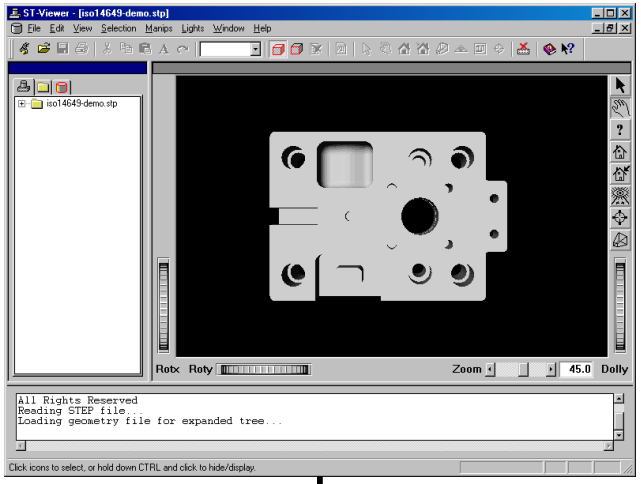
Players
Customers
Supplier
Primes
Contractors



CAD

Functions
Design
Analysis
Manufacture
Fabricate
Support

STEP File

XML DTD

Owner

Approval

Effectivity

Admin System

STEP Database

Internet

XML DTD

Hole

Slot

Pocket

CAM System

Operation

Tool

Strategy

SFP System

Old Process
Large P21 Files
Hard to read
Data Exchange

New Process
Small XML Files
Easier to read
Data Update/Annotate

Advantages of the XML Solution

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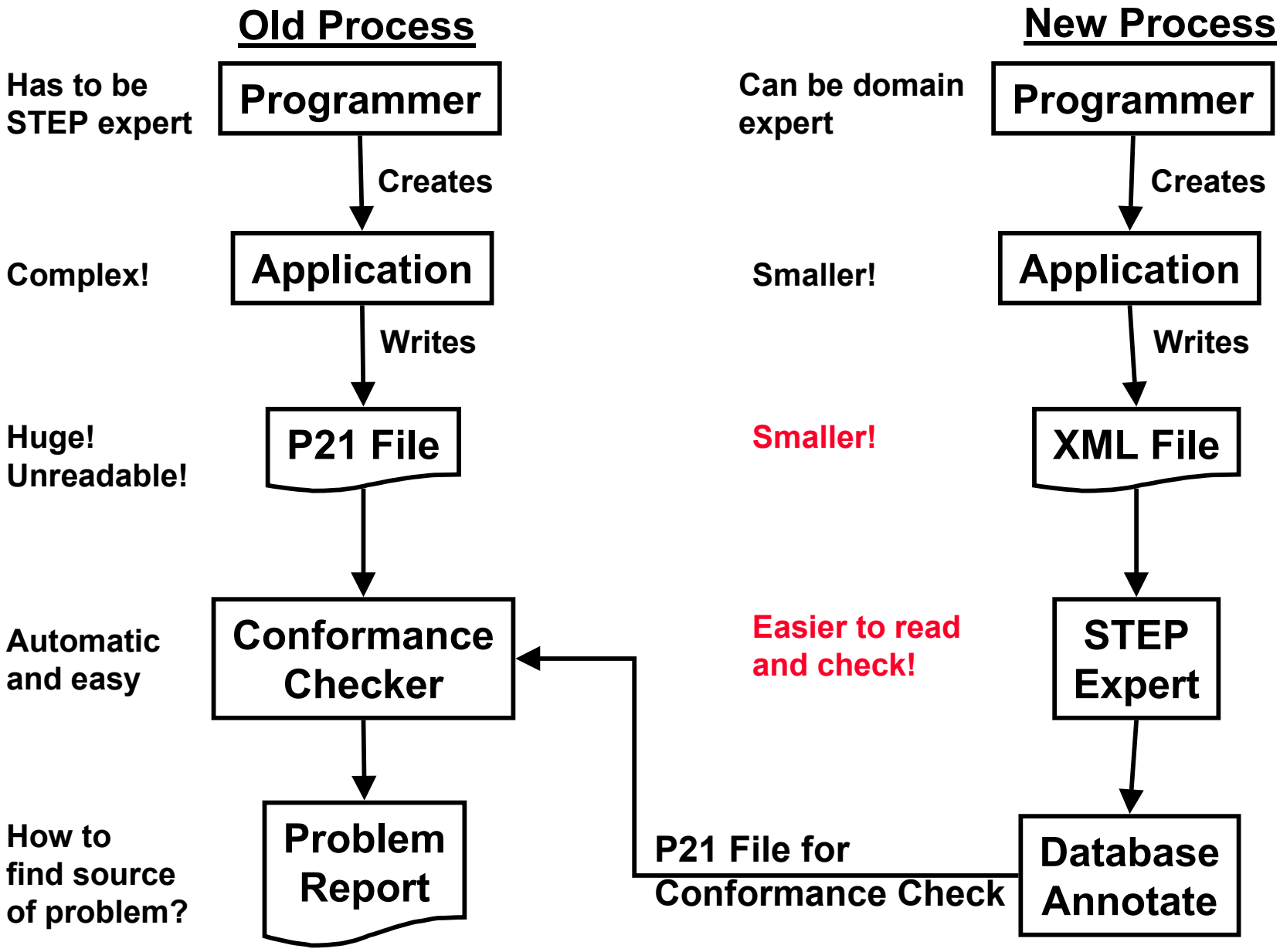
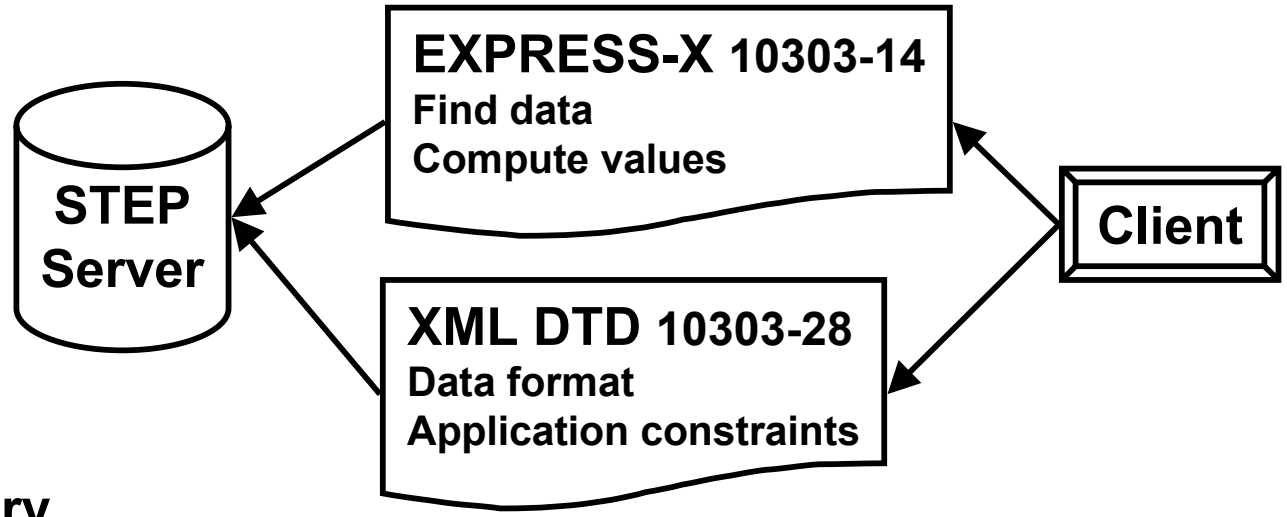
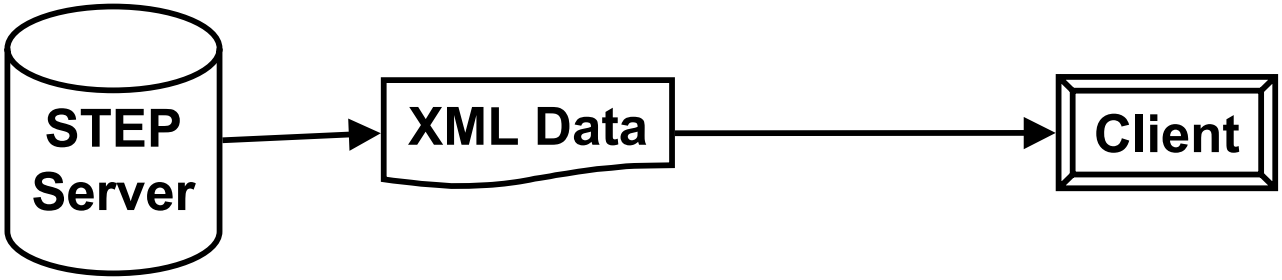


P21 is hard to read and STEP exchange files are very large

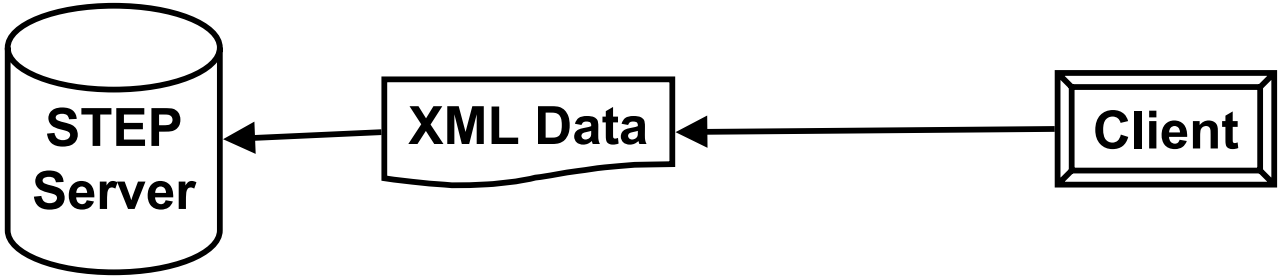
Operation



Query



Query result



Update

Operate like an Rdb
EXPRESS-X for SQL
XML for results

Do not update view data!

Summary

- **XML fixes "real" problems for STEP**
  - How to annotate new data onto existing databases
  - How to enable the implementation of very large Application Protocols
  - How to reduce the cost of implementation for downstream vendors
    - » CAM
    - » CAE
    - » NC Control